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Boda et al.

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[45] **Date of Patent: Sep. 19, 1989**

[54] **ONE PIECE LOWER SKIRT FOR IMPROVING WATER RESISTANCE OF AN OUTBOARD MOTOR**

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[73] Assignee: **Brunswick Corporation**, Skokie, Ill.

[21] Appl. No.: **280,686**

[22] Filed: **Dec. 6, 1988**

Related U.S. Application Data

[62] Division of Ser. No. 77,689, Jul. 24, 1987, Pat. No. 4,800,854.

[51] **Int. Cl.**[4] **F02F 7/00**

[52] **U.S. Cl.** ..... **123/195 P**; 123/198 E; 440/77; 440/88

[58] **Field of Search** ..... 123/195 P, 198 E; 440/77, 88

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,610,198	10/1971	Alexandrowicz	440/77
3,773,010	11/1973	Elingsen	440/77
3,955,526	5/1976	Kusche	440/77
4,723,927	2/1988	Walsh et al.	440/77

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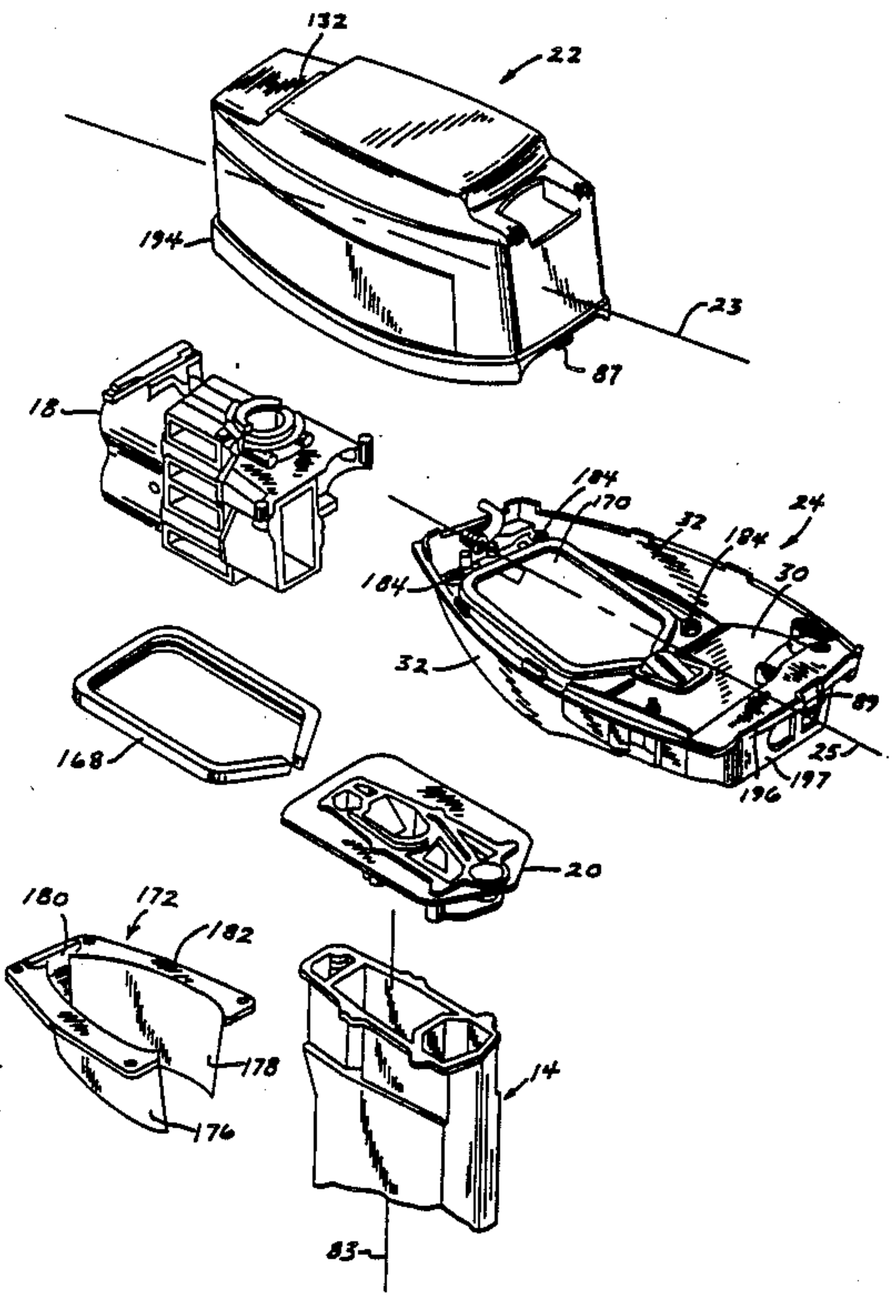
Attorney, Agent, or Firm—Andrus, Sceales, Starke & Sawall

[57] **ABSTRACT**

An outboard marine motor housed by a cowl assembly having an upper cowl section and a lower cowl section includes various features for improving the structural integrity of the cowl assembly and for providing a water-resistant seal at the joint between the cowl sections and at various points of entry of cables and other mechanical devices. A one-piece lower skirt extends downwardly from the lower cowl section at the upper end of the depending gear case. The one-piece lower skirt is adapted for easy removal and attachment to facilitate servicing of the motor, and may be connected to the bottom of the lower cowl section in a plane substantially transverse to the longitudinal axis of the depending gear case.

6 Claims, 6 Drawing Sheets



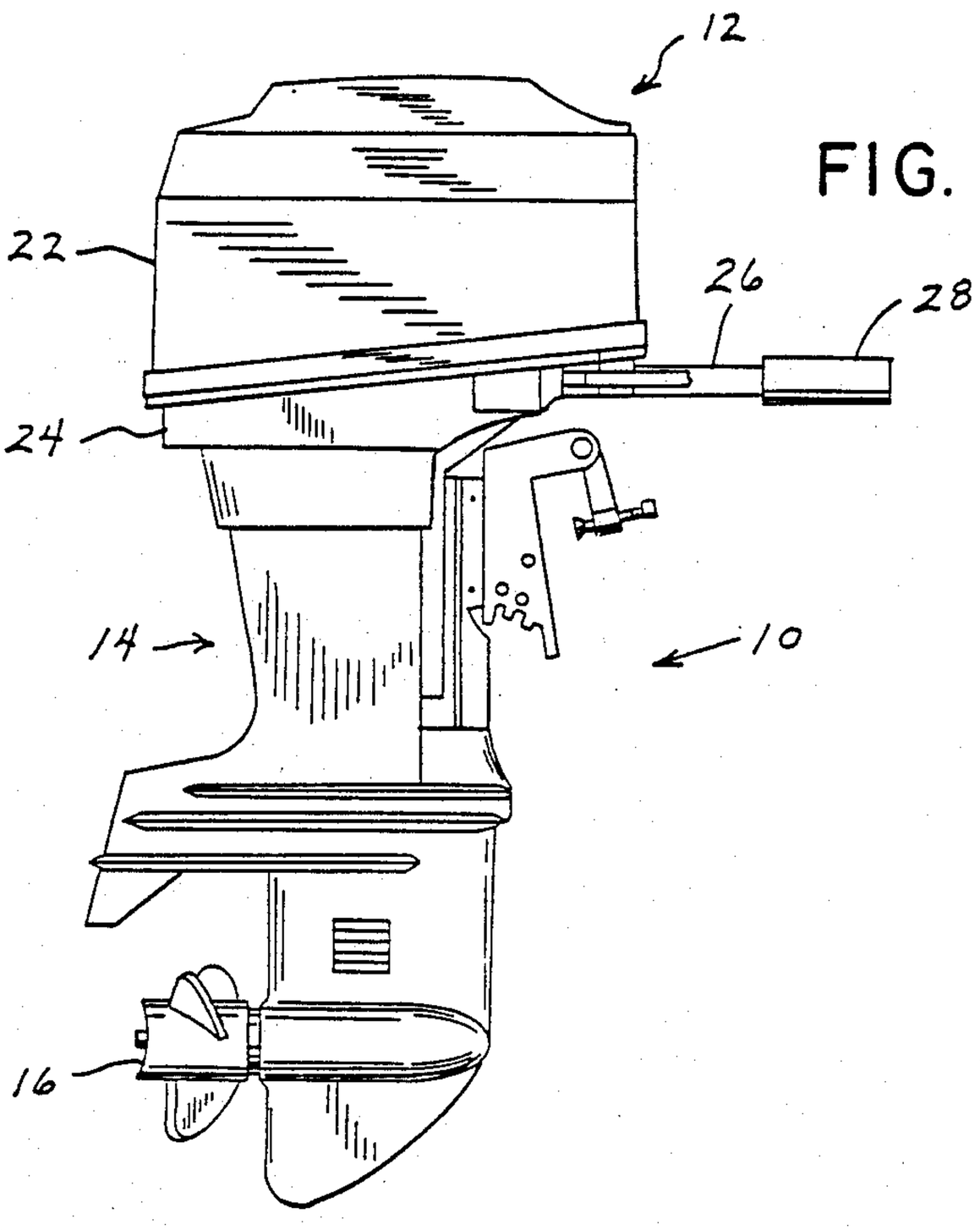


FIG. 1

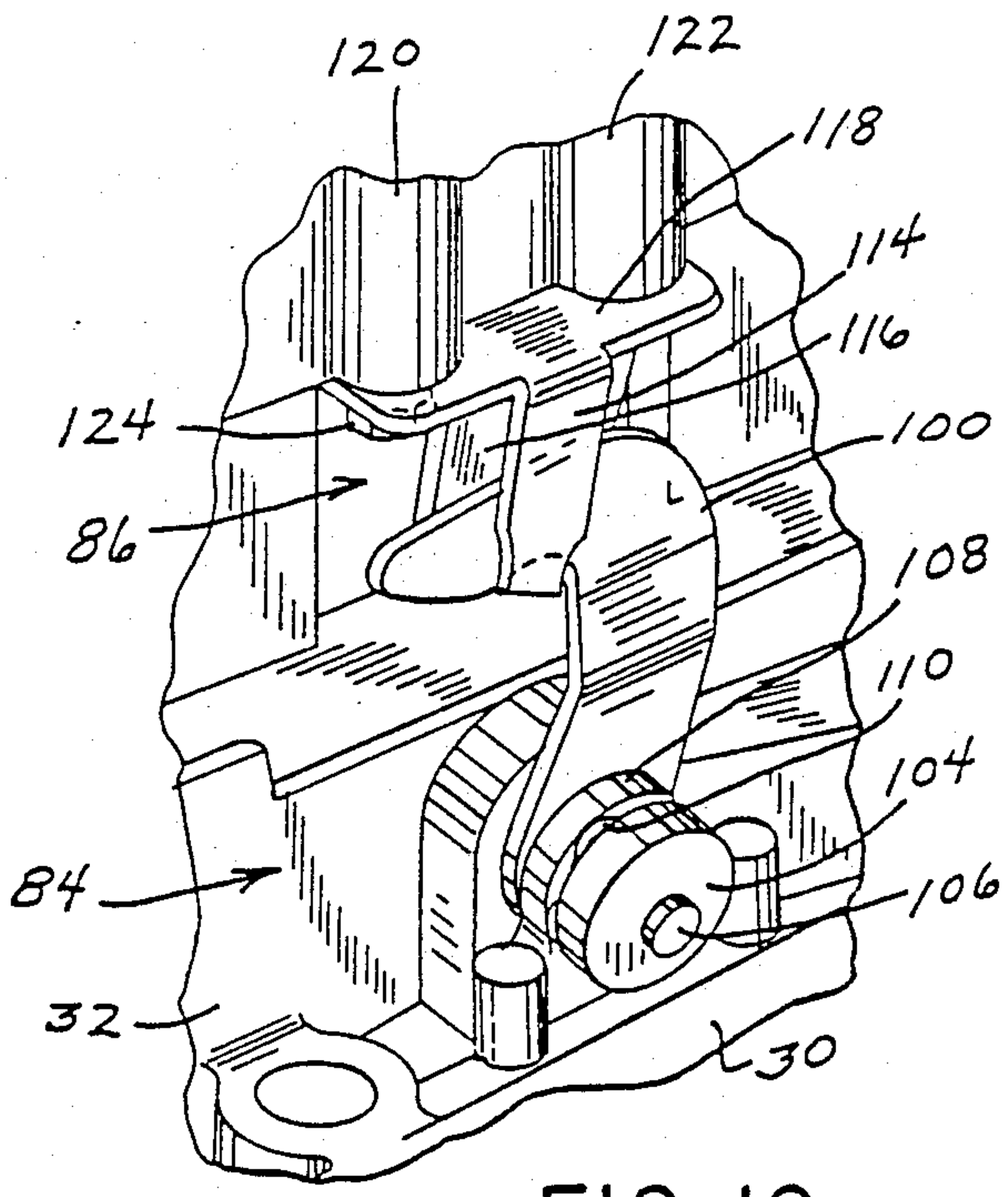
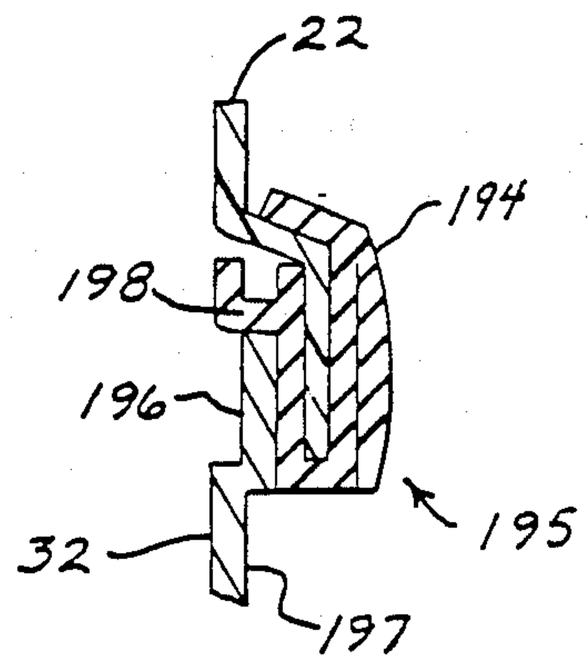


FIG. 10

FIG. 12



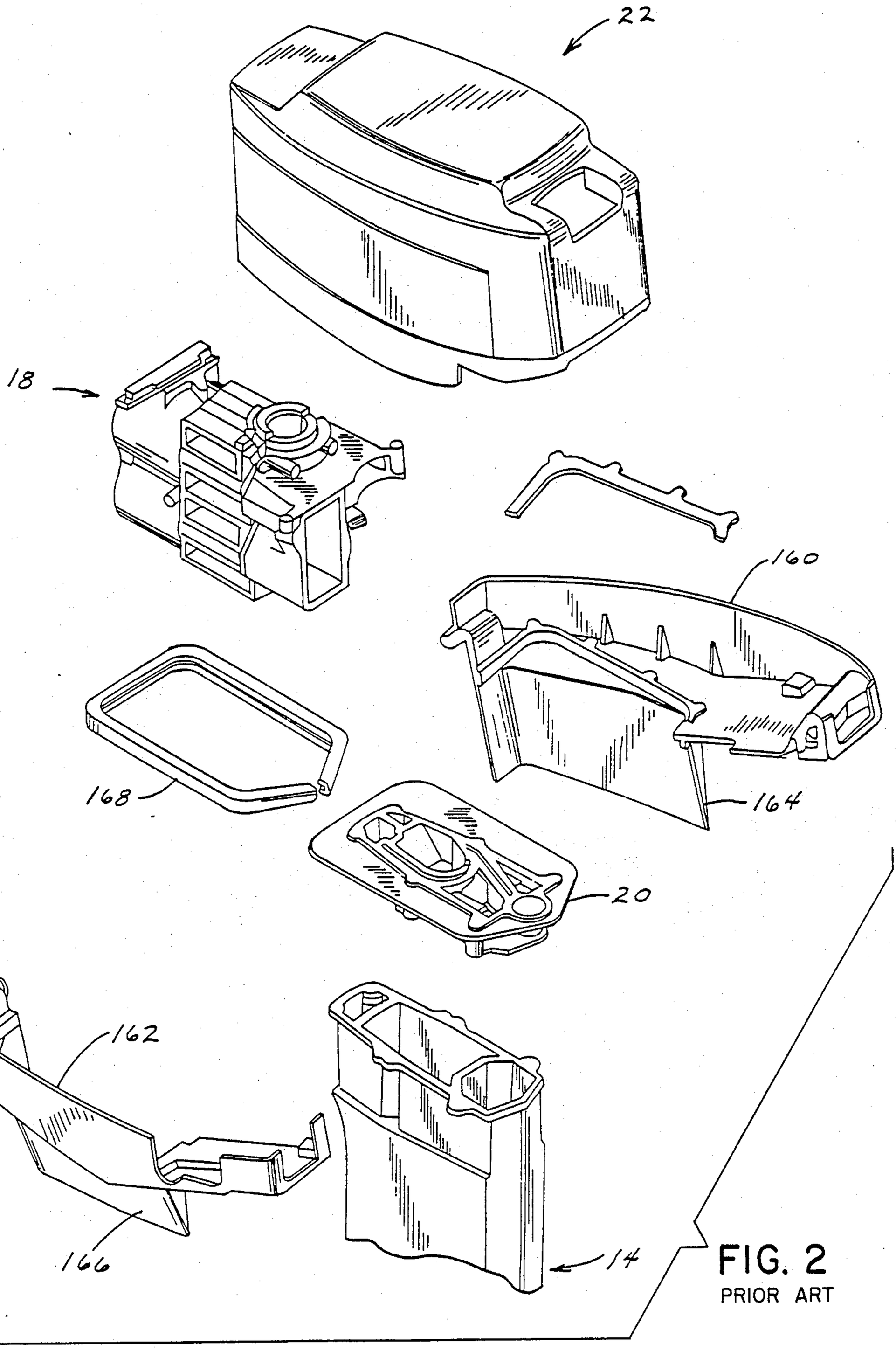
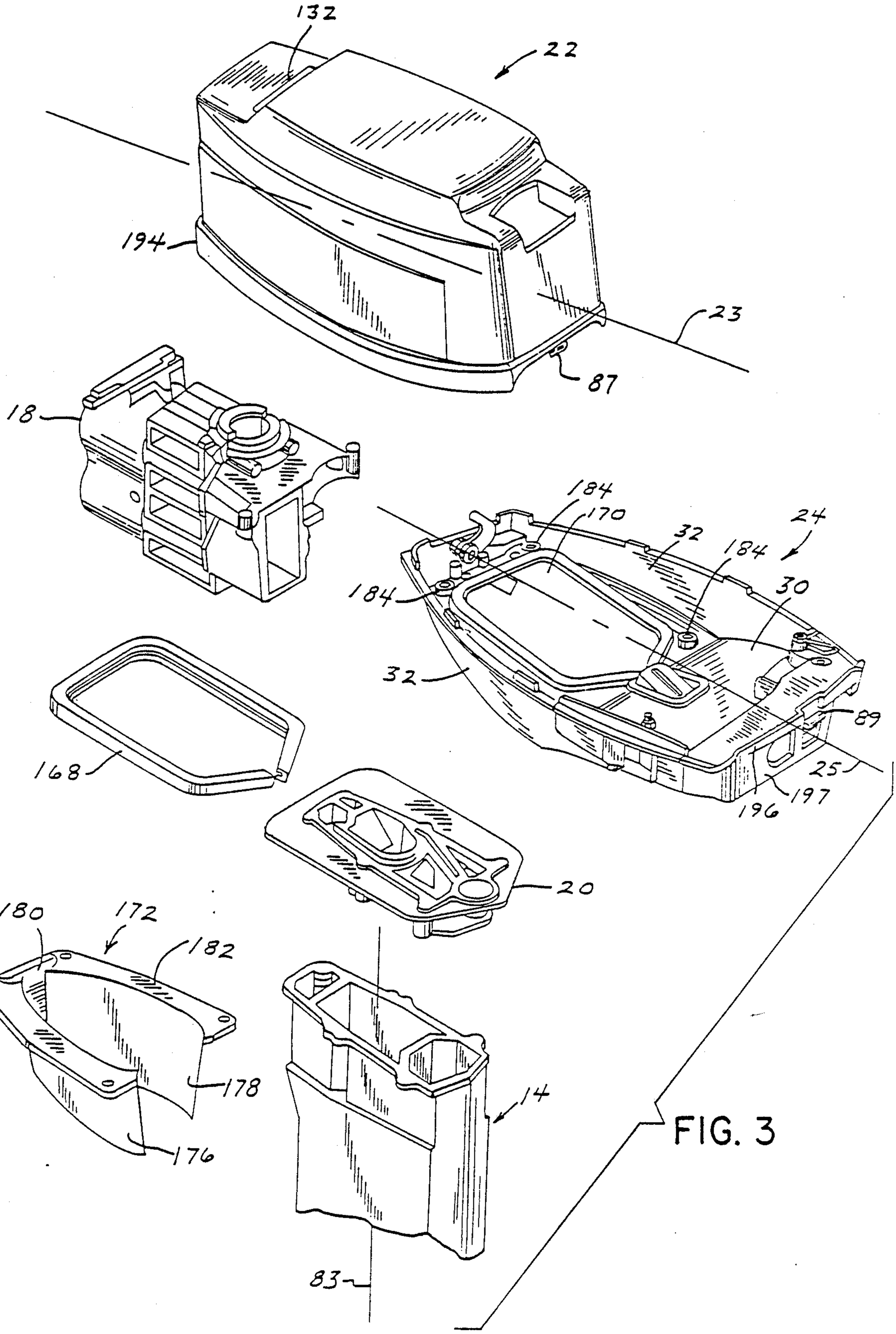


FIG. 2
PRIOR ART


132
22
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23
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170
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172
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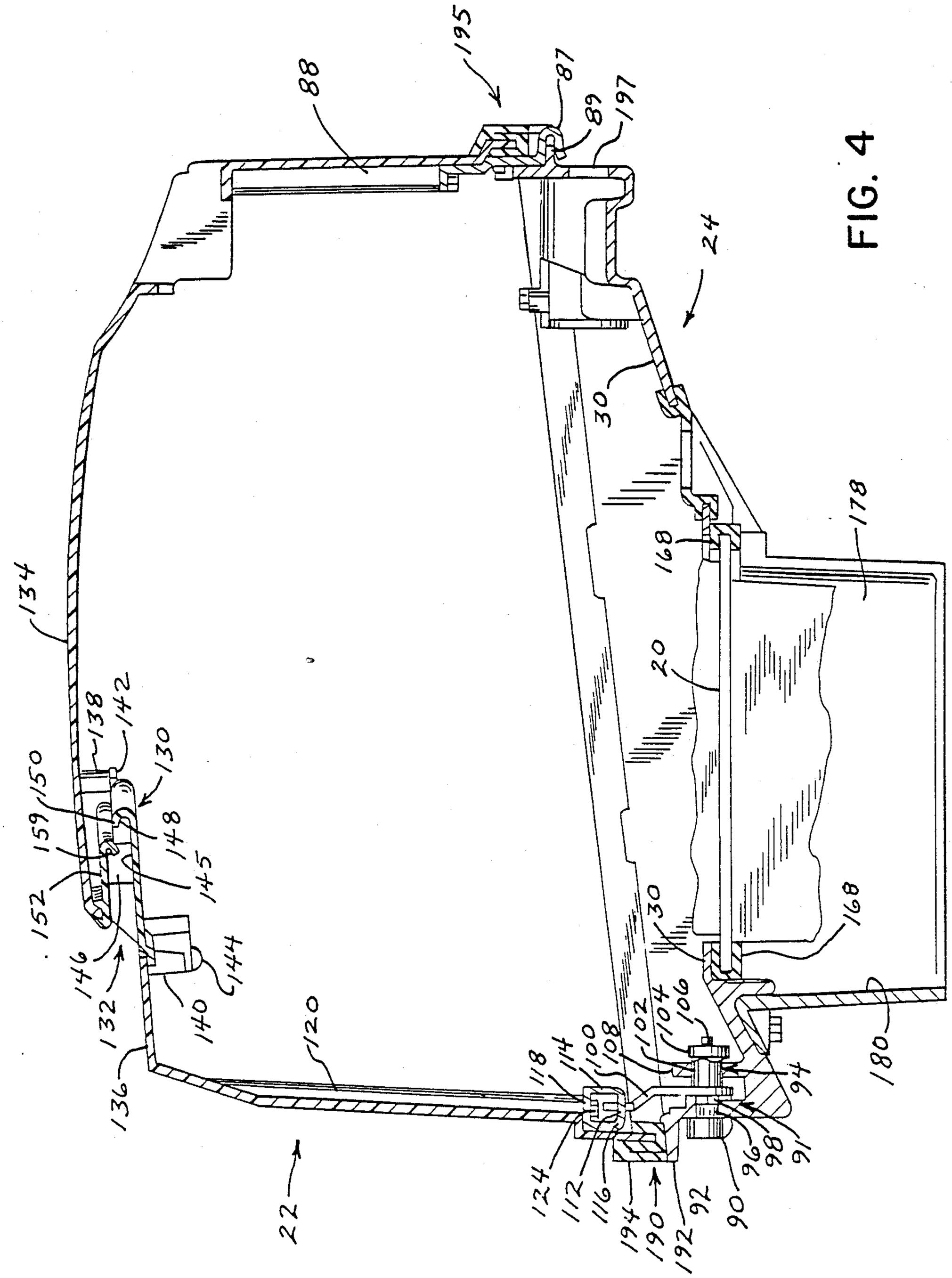
176
14
83

FIG. 3


88
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120
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194
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90
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FIG. 4

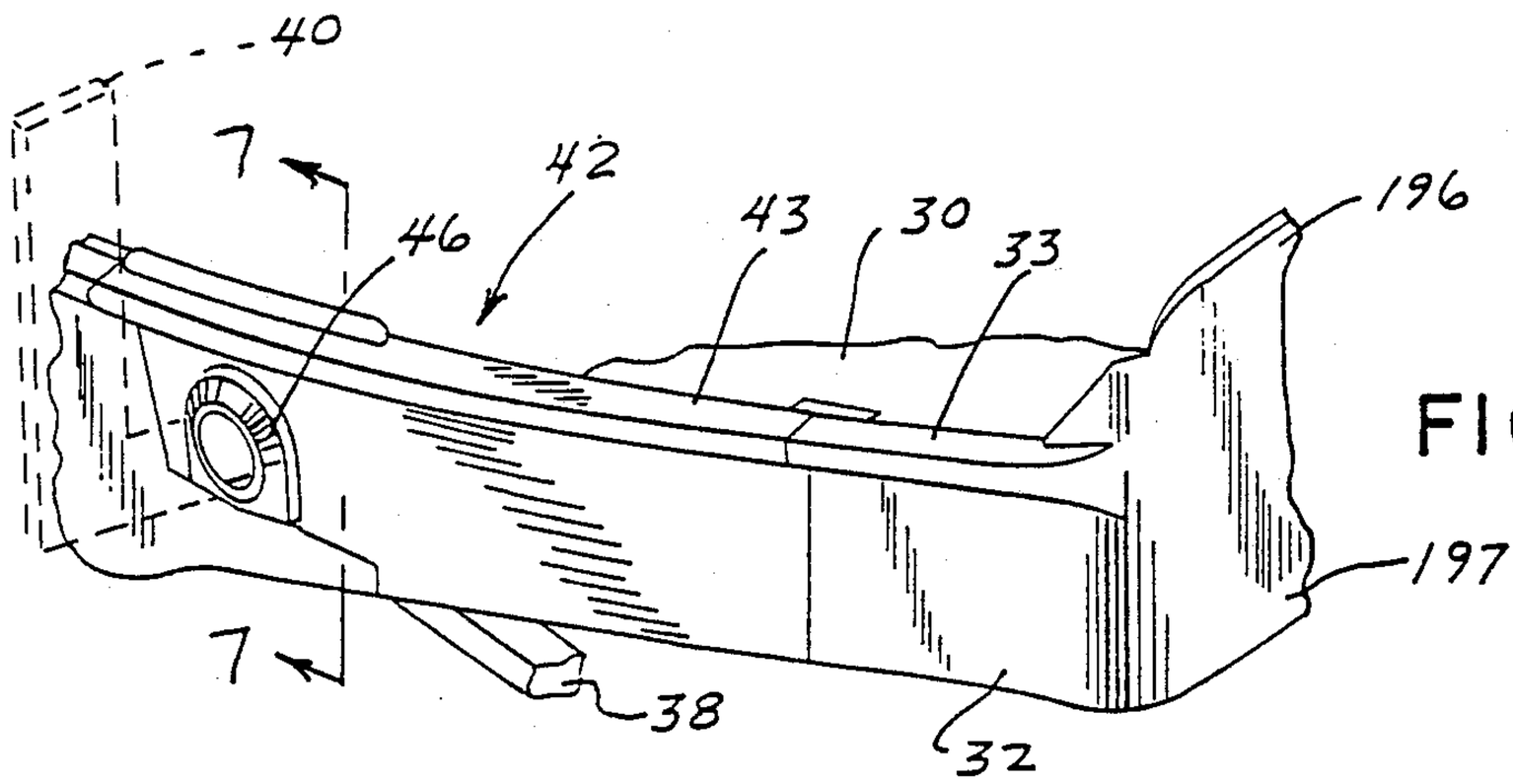


FIG. 5

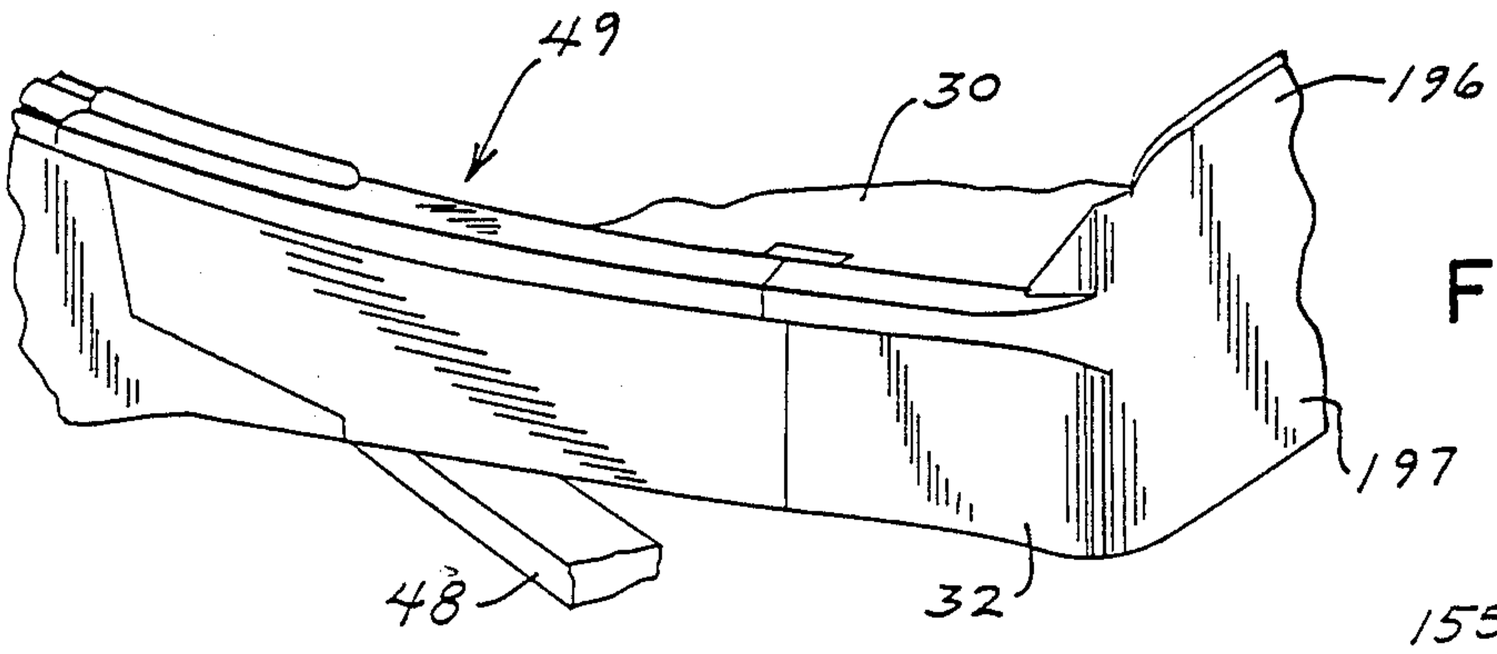


FIG. 6

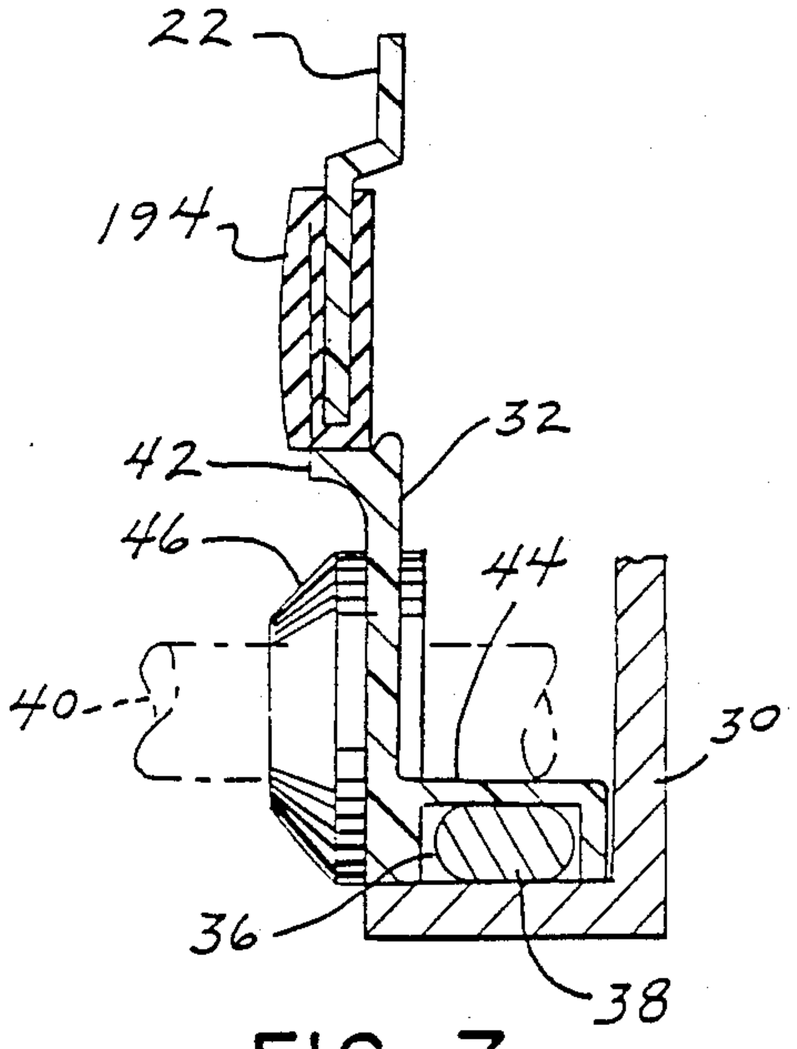


FIG. 7

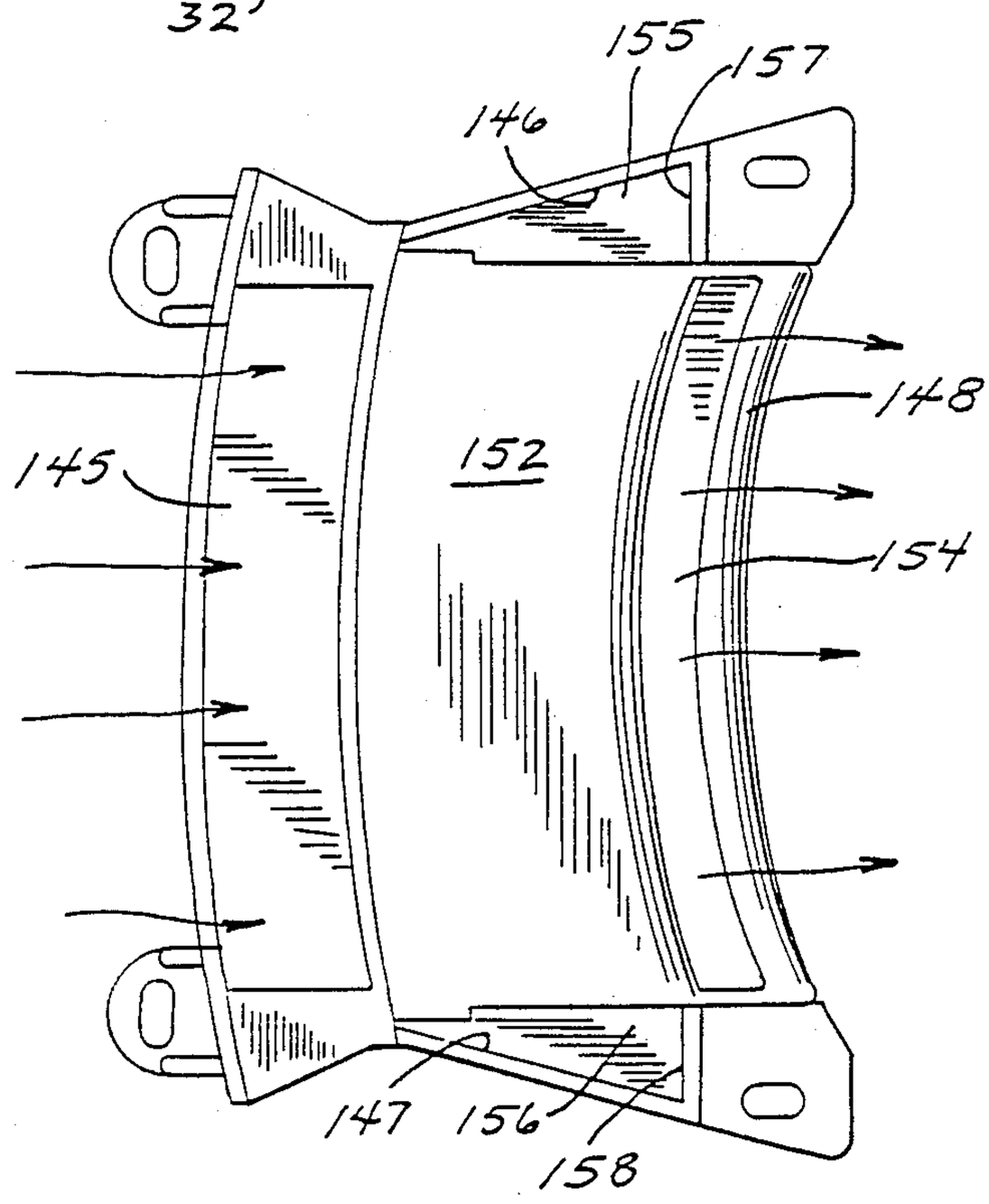


FIG. 11

FIG. 8

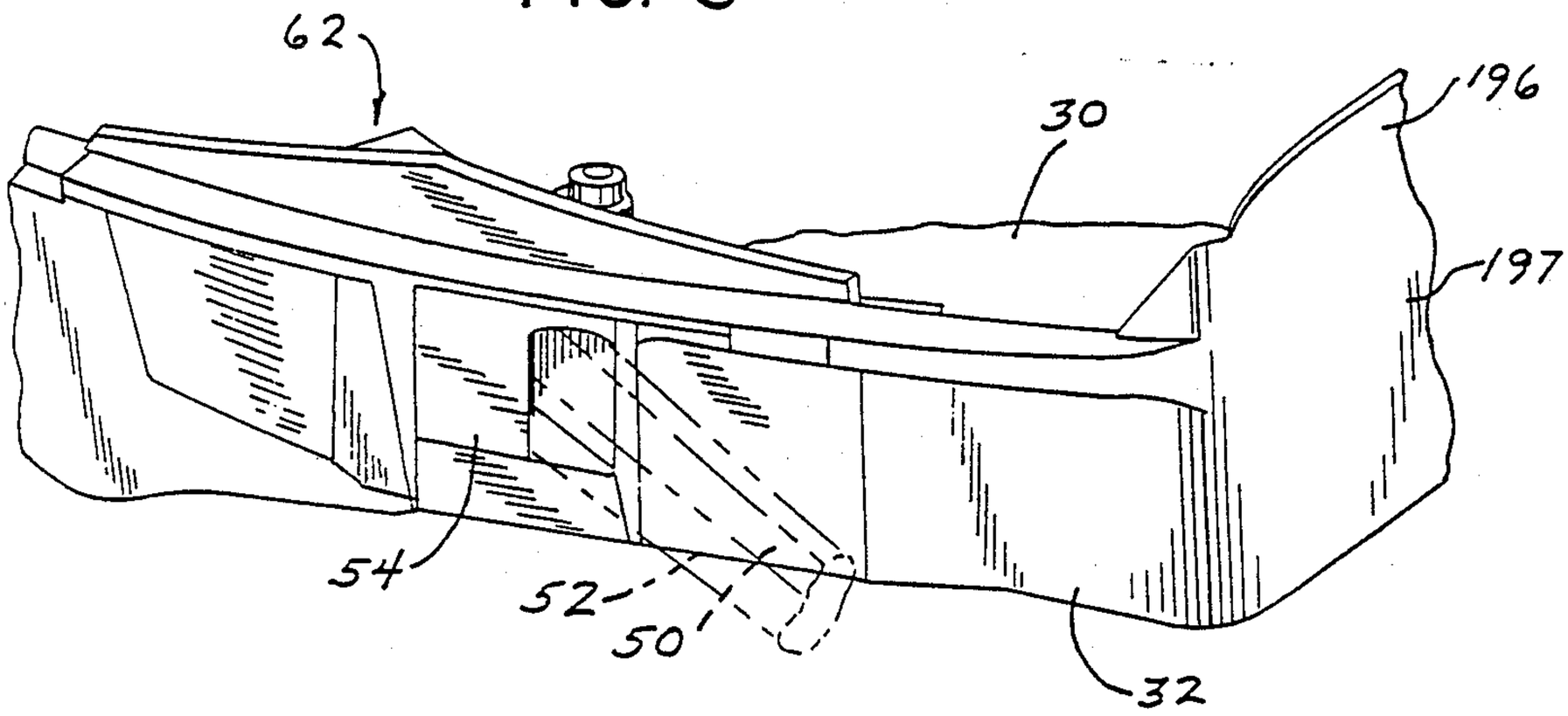
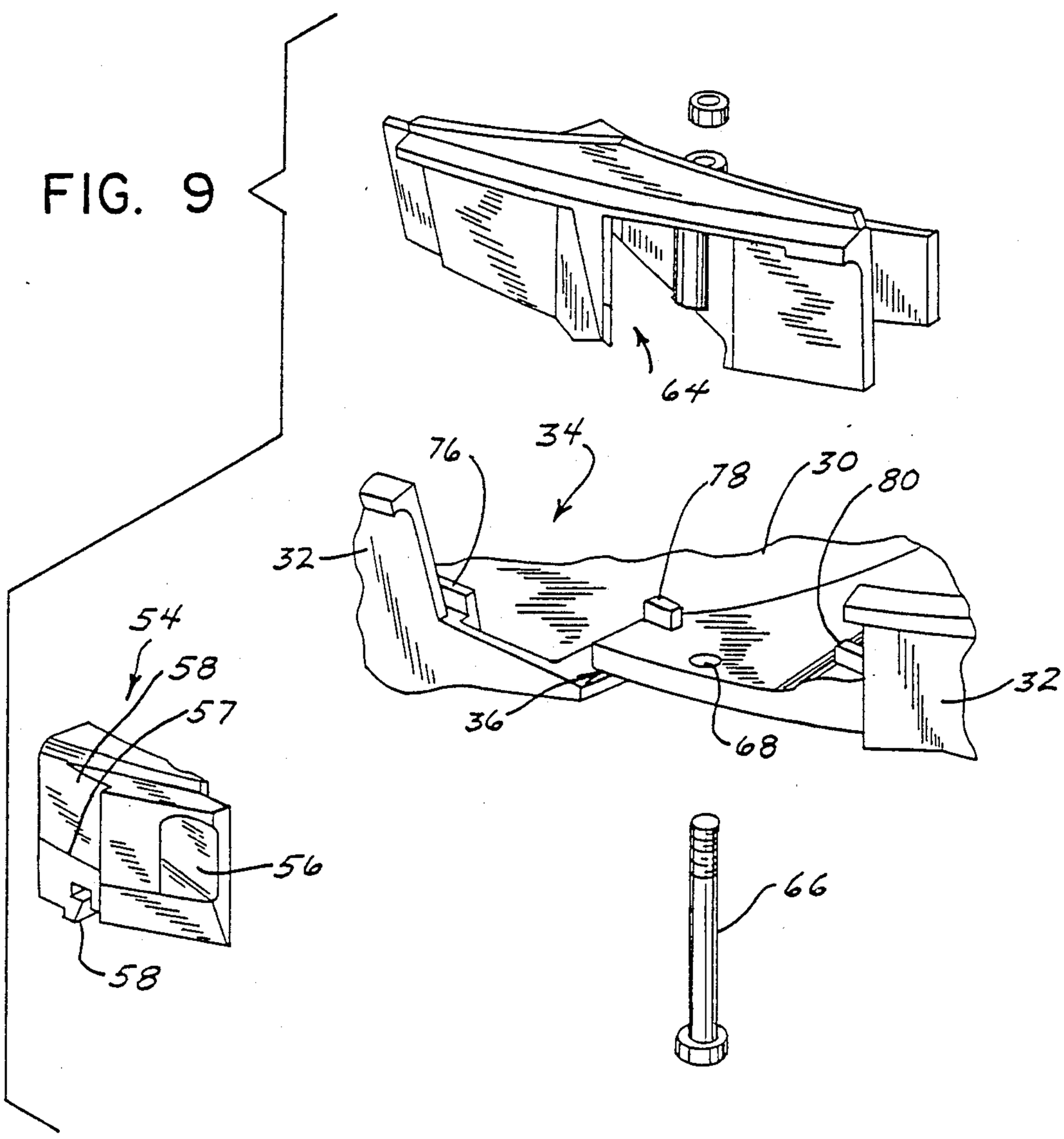


FIG. 9



ONE PIECE LOWER SKIRT FOR IMPROVING WATER RESISTANCE OF AN OUTBOARD MOTOR

This is a division of application Ser. No. 07/077,689 filed July 24, 1987 now U.S. Pat. No. 4,800,854.

BACKGROUND OF THE INVENTION

The present invention relates to outboard marine motors, and more particularly to a cowl assembly for housing the engine portion of an outboard marine motor.

An outboard marine motor generally includes an engine portion and a depending gear case. The engine portion of the outboard motor is typically housed by a cowl assembly. In some outboard motors, the cowl assembly includes an upper cowl section adapted to fit together with a lower cowl section to house the engine portion of the motor. While this configuration is generally desirable and effective for certain sizes of outboard motors, there have been drawbacks to such a construction from the standpoint of resistance to entry of water into the cowl assembly. Certain other features of prior cowl assemblies of this type are undesirable, including the latch mechanism and the lower skirt which depends from the lower cowl section at the upper end of the gear case.

SUMMARY OF THE INVENTION

The present invention incorporates several improvements in a cowl assembly having an upper cowl section and a lower cowl section for housing the engine portion of an outboard marine motor. In combination, the improvements herein disclosed provide a more rigid and water-resistant cowl assembly for an outboard motor, and also facilitate the easy servicing of the outboard motor.

According to one aspect of the present invention, a cowl assembly, including an upper cowl section adapted to fit together with a lower cowl section to house the engine of an outboard motor, is provided with an opening for allowing one or more cables to pass into the interior of the cowl assembly. The opening is provided with sealing means interconnected with the cowl assembly for providing a water resistant seal around the cable at its point of entry into the interior of the cowl assembly. More particularly, the opening is formed by a cut-out portion in the upstanding side wall of the lower pan comprising the lower cowl section. The sealing means is an insert adapted to fit within the cut-out portion in the upstanding side wall of the lower pan. The insert includes cable surrounding means for providing a water resistant seal at the point of entry of the cable into the interior of the cowl assembly. In one embodiment, the cut-out portion forms a bottom cable passage in the bottom of the lower pan section for allowing a cable to enter the interior of the cowl assembly in a direction substantially parallel to the front-rear longitudinal axis of the cowl assembly. The insert is provided with an inverted channel adapted for placement on the bottom of the lower pan section for surrounding the cable at the bottom cable passage. In another embodiment, a shift lever extends through the cut-out portion in the upstanding side wall of the lower cowl section, and is disposed at its point of entry into the interior of the cowl assembly so as to be substantially perpendicular to the front-rear longitudinal axis of the cowl assembly.

The insert is provided with an opening and a flexible grommet for placement within the opening to surround the shift lever at its point of entry to provide a water-resistant seal. In yet another embodiment, a cable is adapted to enter the interior of the cowl assembly through the cut-out portion in the upstanding side wall of the lower cowl section, and is disposed at its point of entry so as to be substantially parallel to the front-rear longitudinal axis of the cowl assembly. A resilient plug is provided to surround the cable at its point of entry, and is adapted to mate with the insert to provide a water-resistant seal at the point of entry.

In accordance with another aspect of the invention, a rotary latch means is provided to secure the upper and lower cowl sections together. The rotary latch means includes a rotatable external handle connected to a shaft extending through the lower cowl section and provided with an internal hook rotatable in response to rotation of the external handle. The shaft extends beyond the hook in the interior of the cowl assembly, and is supported by a support means for preventing lateral movement of the shaft. In one embodiment, the support means comprises an upstanding bearing formed integrally with the lower cowl section and adapted to receive the distal end of the shaft. The hook is engageable with a catch disposed on the upper cowl section. The catch includes a hook engaging portion having a support means disposed on either side of the hook when the hook is engaged with the hook engaging portion of the catch. The catch is supported adjacent an end wall of the upper cowl section, and is also supported at a point spaced from the end wall of the upper cowl section, and the hook engaging portion of the catch means is disposed between the support points.

In accordance with yet another aspect of the invention, an improved air intake duct provides a water-resistant feature for preventing entry of water through the air intake opening which provides combustion air to the engine portion of the outboard motor. The air intake duct also allows air to pass over the portion of the engine which is heated during operation, to pre-heat the combustion air. The air intake duct is adapted for placement in an air intake opening provided in the top rear portion of the upper cowl section. The air intake duct includes a bottom wall, a pair of upstanding side walls connected to the bottom wall, an upstanding back wall extending between the side walls and connected to the bottom wall, and a top wall. The top wall is provided with an upwardly facing opening forming an air inlet, to define an air flow path in which air enters the air intake duct at the air intake opening in the top rear portion of the upper cowl section, and flows in a forward direction toward the back wall of the air intake duct. The air is then deflected upward by the back wall and passes through the opening in the top wall, thereafter entering the interior cavity of the cowl assembly. In this manner, any moisture contained within the air is prevented from entering the interior of the cowl assembly by the upstanding back wall of the intake duct. Furthermore, positioning of the air intake opening at the rear top portion of the cowl section allows air to pass over the engine portion prior to its entry into the combustion chamber through the carburetor. This pre-heating of the combustion air prevents icing of the carburetor in cold conditions. Additionally, the air intake duct provides a convenient hand grip for manually manipulating the motor when necessary.

In accordance with yet another aspect of the invention, a one-piece lower skirt extends downwardly from the cowl assembly at the upper end of the depending gear case. The one-piece lower skirt includes a pair of spaced sides and a back wall, which define an opening for receiving the upper end of the depending gear case. The one-piece skirt is provided with a flange for connecting the skirt to the lower cowl portion, and is adapted for easy removal and attachment to facilitate servicing the motor.

In accordance with yet another aspect of the invention, a sealing means provides a water resistant seal at the joint between the upper and lower cowl sections about the entire periphery of the joint. The lower cowl section is provided with an upstanding lip about its periphery, and a resilient abutting strip is disposed about the periphery of the upper cowl section to abut the lip when the upper and lower sections are fit together for forming a water resistant seal at the joint. A portion of the periphery, generally the front end of the cowl assembly, is provided with a face, and the upstanding lip adjacent the face is generally parallel to the upstanding side wall of the lower cowl section forming the face. The resilient abutting strip has an abutting surface to engage this portion of the lip.

BRIEF DESCRIPTION OF THE DRAWINGS

The drawing illustrate the best mode presently contemplated of carrying out the invention.

In the drawings:

FIG. **1** is a side elevation view of an outboard motor showing a cowl assembly including the features of the present invention;

FIG. **2** is an exploded perspective view showing a prior art cowl assembly construction;

FIG. **3** is an exploded perspective view showing various of the features of the cowl assembly of the present invention;

FIG. **4** is a partial longitudinal sectional view of the cowl assembly of the present invention;

FIG. **5** is a perspective view showing one embodiment of the cable entrance sealing means of the present invention;

FIG. **6** is a perspective view similar to that of FIG. **5**, showing another embodiment thereof;

FIG. **7** is a sectional view taken generally along lines 7—7 of FIG. **5**;

FIG. **8** is a perspective view similar to that of FIGS. **5** and **6**, showing another embodiment thereof;

FIG. **9** is an exploded perspective view of the various components of the cable entrance sealing means of FIG. **8**;

FIG. **10** is a perspective view showing the latch mechanism of the present invention;

FIG. **11** is a top plan view showing the air intake duct of the present invention; and

FIG. **12** is a detailed sectional view showing the front-end sealing means of the present invention.

DETAILED DESCRIPTION

As shown in FIG. **1**, an outboard motor **10** includes an upper engine portion **12** and a lower depending gear case **14**. A propeller **16** is provided at the lower end of gear case **14**, for propelling a boat through water, as is well known.

Referring to FIGS. **1–3**, engine portion **12** of outboard motor **10** generally includes an engine **18** adapted for mounting on an adapter plate **20**, which is adapted for mounting to the upper end of gear case **14**. An upper cowl section **22** and a lower cowl section **24** house engine **18** of outboard motor **10**. Upper and lower cowl sections **22** and **24** extend generally along parallel and coplanar longitudinal front-rear axes **23** and **25**, respectively. Lower cowl section **24** is adapted to receive adapter plate **20**, and engine **18** is positioned thereabove so as to be contained within a cavity formed by upper cowl section **22** and lower cowl section **24** when fit together.

Referring to FIG. **1**, a tiller arm **26** extends from lower cowl section **24**. Tiller arm **26** includes a throttle handle **28** for controlling motor **10**, and is also used to control the orientation of motor **12** about a vertical axis, to steer the boat to which motor **10** is attached. In addition, shift controls may also be provided in the tiller arm **26**, including forward, neutral and reverse. Tiller arm **26** generally includes a stop control.

Lower cowl section **24** is formed of a lower pan having a bottom **30** and an upstanding side wall **32** extending therefrom about the periphery of bottom **30**. Upstanding side wall **32** includes a top edge **33**. Upstanding side wall **32** is provided with a cut-out portion **34** (FIG. **9**), which is adapted to receive cables or other mechanical components for several different engine models and configurations, to allow the same lower cowl section **24** to be used for each of the different models. Referring to FIG. **9**, a bottom passage **36** is formed in bottom **30** of lower cowl section **24** and extends inwardly into bottom **30**. Bottom passage **36** is generally perpendicular to front-rear axis **25** of lower cowl section **24**.

With reference to FIG. **5**, in an outboard motor configuration having a manual tiller-operated motor with a separate shift lever, a throttle cable **38** is located exteriorly of lower cowl section **24**, and is adapted to pass therethrough at bottom passage **36** for entry into the interior of the cowl assembly for connection to internal throttle controls connected to engine **18** (not shown). Throttle cable **38** extends from tiller arm **26** adjacent the point where tiller arm **26** is connected to lower cowl section **24**, and is disposed at bottom passage **36** so as to be generally parallel to front-rear axis **25** of lower cowl section **24**. A manual shift lever **40** extends through lower cowl section **24** at cut-out portion **34**, and is manually operable by the user for shifting the gears of outboard motor **10**. The shaft of shift lever **40** is disposed at its point of entry into lower cowl section **24** so as to be substantially perpendicular to front-rear axis **25** of lower cowl section **24**.

An insert **42** is adapted for placement within cut-out portion **34** of upstanding side wall **32**. Insert **42** fills the void created by cut-out portion **34** in upstanding side wall **30**, and is intended to provide a water resistant seal thereat. Insert **42** includes a top edge **43**, which is generally aligned with top edge **33** of upstanding side wall **32** at cut-out portion **34**. As seen in FIG. **7**, insert **42** includes an inverted channel **44**, which is adapted for placement on bottom **30** of lower cowl section **24** at bottom passage **36**, to define a rectangular cable-receiving passage leading into the interior of the cowl assembly. The cable receiving passage so defined is substantially perpendicular to front-rear axis **25** of the lower cowl section **24**.

Insert **42** is held in place within cut-out portion **34** by a bolt/nut combination extending through bottom **30** and engaging a bolt-receiving portion formed on insert **42**. When insert **42** is so held, cable **38** is effectively

clamped between bottom **30** and the top of inverted channel **44**. In this manner, flexing of cable **38** due to engine vibration, shake and torque reactions takes place outside of the cowl assembly, thereby eliminating chafing of cable **38**.

Insert **42** also includes an opening in its side for accommodating the shaft of shift lever **40**. The opening in insert **42** for shift lever **40** is provided with a circular grommet **46**, which is sized so as to fit relatively closely about the shaft of shift lever **40** extending therethrough. In this manner, with the placement of insert **42** within cut-out portion **34** of upstanding side wall **32**, and with the provision of inverted channel **44** and grommet **46** therein, a substantially water-resistant seal is provided at the points of entry of throttle cable **38** and the shaft of shift lever **40** into the interior of the cowl assembly.

In another embodiment shown in FIG. **6** involving an outboard motor having manual throttle and shift controls in the tiller arm, a single cable **48** leads from tiller arm **26** and contains the throttle cable and the shift cable. When the shift control is included in a cable such as **48**, the shift lever **40** of FIG. **5** is thereby eliminated. In the embodiment of FIG. **6**, throttle/shift cable **48** enters into the interior of the cowl assembly through bottom passage **36** provided in bottom **30** of lower cowl section **24**. Throttle/shift cable **48** is disposed at its point of entry into the interior of the cowl assembly so as to be substantially parallel to front-rear axis **25** of lower cowl section **24**. In this embodiment, an insert **49** serves to close cut-out portion **34** of upstanding side wall **32**, and includes an inverted channel such as **44** to accommodate the entry of throttle/shift cable **48** through bottom passage **36** formed in bottom **30** of lower cowl section **24**. As in the embodiment of FIG. **5**, insert **49** is held in place within cut-out portion **34** by a bolt/nut combination, which serves to clamp cable **48** within opening **36** to eliminate chafing of cable **48** as described above.

In the embodiment of FIG. **8** involving an outboard motor having remote throttle and shift controls, a throttle cable **50** and a shift cable **52** extend from a remote control (not shown) for outboard motor **10**. Throttle cable **50** and shift cable **52** are disposed at their point of entry into the interior of the cowl assembly through cut-out portion **34** so as to be substantially parallel to longitudinal front-rear axis **25** of lower cowl section **24**. To accommodate the entry of cables **50** and **52** through cut-out portion **34** of upstanding side wall **32**, a resilient plug **54** having an opening **56** extending therethrough is adapted to surround cables **50** and **52**. Plug **54** has a slit **57** along its length at the bottom of opening **56**. The outer wall **58** of plug **54** is thereby movable to accommodate passage of cables **50** and **52** therethrough into opening **56**.

With cables **50** and **52** in a side-by-side relationship, there is no need for any cable to enter into the cowl assembly through bottom passage **36**. Therefore, resilient plug **54** is provided with a lower plug portion **58**, which is adapted to plug bottom passage **36** in bottom **30** of lower cowl section **24**. After cables **50** and **52** have been positioned within opening **56** of resilient plug **54**, lower plug **58** is inserted into bottom passage **40**.

Referring to FIG. **9**, an insert **62** includes a passage **64** for mating with and receiving plug **54**. After plug **54** is positioned so as to surround cables **50** and **52** and lower plug portion **58** inserted in bottom passage **36**, insert **62** is positioned above cut-out portion **34** and slid downwardly so that passage **64** in insert **62** mates with plug **54**, as shown in FIG. **8**. This installation of insert **62** provides a water-resistant seal at the point of entry of cables **50** and **52** into the interior of the cowl assembly, and also seals unused bottom passage **36**. A bolt **66** is passed through an opening **68** provided in bottom **30** of lower cowl section **24**, and also through a passage **70** provided in a lug **72** connected to insert **62**. A nut **74** is threaded onto bolt **66** to secure insert **62** within cut-out portion **34** of upstanding side wall **36**.

As shown in FIG. **9**, a series of upstanding locating tabs **76**, **78**, **80** are formed on lower cowl section **24** adjacent cut-out portion **34** of upstanding side wall **32** for locating and reinforcing the placement of insert **62** within cut-out portion **34**. Tab **76** is formed on the inside of upstanding side wall **32**, while tabs **78** and **80** are formed on bottom **30** of lower cowl section **24**. Tabs **76-80** prevent lateral movement of insert **62** after it has been secured within cut-out portion **34**. Tabs **76-80** also serve the same function in connection with the installation of inserts **42** and **48** within cut-out portion **34** of upstanding side wall **32**.

The above three embodiments of the cable entrance sealing means of the present invention all provide for entry of one or more cables into the interior of the cowl assembly so that the cables are disposed at their point of entry so as to be substantially parallel to front-rear axis **25** of lower cowl section **24**. In contrast, prior art systems generally provided for cable entry in a direction substantially perpendicular to the front-rear longitudinal axis of the cowl assembly. Positioning of the cables at their point of entry in accordance with the present invention facilitates the elimination of chafing on the cables due to their movement during operation.

The sealing means of the present invention is also a substantial advance over the art in that a single lower cowl section **24** may be used for several different outboard motor styles and configurations. As above described, the insert for placement within cut-out portion **34** of upstanding side wall **32** need only be modified to accommodate the entry of certain cables at certain locations, and also provision of a manual shift lever, if desired.

Referring now to FIGS. **4** and **10**, a latch mechanism **82** disposed on one end wall of upper cowl section **22** includes a rotary latch **84** and a catch mechanism **86**. The other end wall of upper cowl section **22** is provided with a depending hook **87**, which is bolted at its upper end to a columnar boss **88** formed itegrally with the end wall of upper cowl section **22**. Hook **87** is engageable with a projecting tongue **89** formed integrally with upstanding side wall **32** of lower cowl section **24**. Engagement of hook **87** with tongue **89** secures upper cowl section **22** to lower cowl section **24** at one end, and latch mechanism **82** releasably secures the cowl sections at the other end.

Rotary latch **84** has an external rotatable handle **90** connected to a shaft **91** extending therefrom. Shaft **91** has a proximal end **92** adjacent handle **90**, and a distal end **94** spaced therefrom. Shaft **91** extends through and mates with an opening provided in upstanding side wall **32** of lower cowl section **24**. Proximal end **92** of shaft **91** is provided with a rounded portion adjacent to and extending from external handle **90** for mating with the opening provided in upstanding side wall **32**. A rectangular portion **98** is provided on shaft **91** adjacent to and extending from rounded portion **96**. An internal hook **100** is mounted on shaft **91** at rectangular portion **98**. Hook **100** is provided with a rectangular opening

adapted to mate with and be engaged by rectangular portion **98** of shaft **91**, so that hook **100** is rotatable in response to rotation of external handle **90**. Distal end **94** of shaft **91** is provided with a rounded portion **102**, which has an internal longitudinal passage adapted to receive and mate with rectangular portion **98**. An enlarged portion **104** is provided adjacent rounded portion **102**.

A screw **106**, the end of which is shown in FIG. **10**, extends through the components of shaft **91** to hold the various components together in an assembled relation. The head of screw **106** fits within a recess in external handle **90**.

As seen in FIG. **4**, shaft **91** is supported adjacent its proximal end by the bearing of rounded portion **96** on the internal surface of the opening provided through upstanding side wall **32** of lower cowl section **34**. Shaft **91** is also supported adjacent its distal end by an upstanding bearing **108**, so that hook **100** is disposed between the points of support of shaft **91**. Upstanding bearing **108** is formed integrally with bottom **30** of lower cowl section **24**, and has an opening sized so as to mate with rounded portion **102** of shaft **91**. Tightening of screw **106** brings enlarged portion **104** of shaft **91** to bear against the side of upstanding support **108**, where a wave washer **110** is disposed therebetween to provide smooth turning of rotary latch **84**.

Provision of support **108** for shaft **91** at a point beyond hook **100** ensures a secure connection of upper cowl section **22** to lower cowl section **24**. Support **108** prevents movement of shaft **91** when outboard motor **10** is subject to jarring, such as that resulting from a collision with an obstacle such as a submerged log during operation. Such support for shaft **91** ensures that hook **100** will remain in place during such jarring.

Hook **100** is engageable with catch mechanism **86**, which includes a hook engaging portion **112** extending substantially perpendicular to the end wall of upper cowl section **22**. Hook engaging portion **112** is supported at its ends by right support **114** and left support **116**, which in turn depend from an upper plate **118**. Left support **116** is adjacent the end wall of upper cowl section **22**, and right support **114** is spaced therefrom. Hook **100** engages hook engaging portion **112** at a point between right support **114** and left support **116**. Upper plate **118** is adapted for connection to a pair of columnar bosses **120, 122** formed integrally with the end wall of upper cowl section **22**, by means of a pair of bolts, one of which is shown at **124**.

The above-described construction of catch mechanism **86** provides a hook engaging surface which is supported at both ends for receiving the hook of latch mechanism **86** therebetween, thereby eliminating the cantilever of the hook engaging portion from the end wall of upper cowl section **22** normally found in such a catch mechanism. This again ensures a secure attachment of upper cowl section **22** to lower cowl section **24**.

Referring now to FIG. **4**, the present invention includes an air intake duct **130** for placement within an air intake opening **132** formed in the top rear portion of upper cowl section **22**. The air intake opening **132** is formed between an upper top wall **134** and a lower top wall **136** of upper cowl section **22**. A pair of bosses **138**, only one of which is shown, depend from upper top wall **134**. Similarly, a pair of bosses **140**, only one of which is shown, depend from lower top wall **136**. Air intake duct **130** is adapted for placement in the interior of upper cowl section **22** adjacent air intake opening **132**, and is connected to upper and lower top wall bosses **138, 140** using screws **142, 144** through openings provided in tabs on air intake duct **130** (FIG. **11**).

Air intake duct **130** includes a bottom wall **145** and a pair of spaced upstanding side walls **146, 147** connected thereto. A back wall **148** is connected to bottom wall **145**. Back wall **148** is curved to provide an upper lip **150** (FIG. **4**), and is also curved in a horizontal plane (FIG. **11**).

A top wall **152** extends between side walls **146, 147**, and is provided with an upwardly facing opening **154** to form an air inlet for allowing air to pass into the interior of the cowl assembly. As shown in FIG. **11**, top wall **152** extends less than the full distance between side walls **146** and **147**, to thereby form auxiliary upwardly facing air inlet openings **155, 156** adjacent the top of each side wall for passage of air therethrough into the interior cavity of the cowl assembly. Back wall portions **157, 158** define the back of upwardly facing openings **155, 156**, respectively.

As best seen in FIG. **4**, the innermost edge of top wall **152** is provided on its underside with a depending curved lip **159**. The top of back wall **148** is disposed at an elevation below that of top wall **152**, so that the air inlet formed by the termination of top wall **152** is disposed at an elevation lower than that of top wall **152**. It should be understood that the invention also contemplates the extension of top wall **148** the full height of side walls **146, 147**, so that the air inlet formed by opening **154** is coplanar with top wall **152**. It should also be understood that the upwardly facing air inlet openings adjacent the top edges of side walls **146, 147** may also be eliminated by increasing the size of opening **154** and extending top wall **152** the entire distance between side walls **146, 147**.

Air intake duct **130** thus defines an air flow path in which air enters intake duct **130** at air intake opening **132** and flows in a forward direction toward back wall **148**, and is then deflected upwardly by back wall **148** through opening **154** to enter the interior cavity of the cowl assembly. The upward deflection of the air during its entrance into the interior of the cowl assembly prevents the entrance of any moisture contained within the air into the interior cavity as a result of the change in direction of the air flow provided by the air flow path defined by air intake duct **130**. Lips **150, 159** also act to capture and prevent the entrance of any moisture contained within the air into the interior of the cowl assembly.

Furthermore, the placement of air intake opening **132** in the rear top portion of upper cowl section **22** allows for passage of combustion air over the heated portion of the outboard motor engine. Such air flow pre-heats the combustion air prior to its entry to the combustion chamber through the carburetor, to prevent icing of the carburetor in cold weather operating conditions.

The above described construction of air intake duct **130** provides an unobstructed hand grip for use in manually manipulating outboard motor **10**. For example, the user's fingers may be inserted into the space between bottom wall **142** and top wall **152** to aid in tilting the motor forward.

Referring to FIG. **4**, bottom wall **145** of air intake duct **130** slopes rearwardly away from back wall **148**, so that moisture collected within duct **130** from air flowing therethrough may exit duct **130** and drain therefrom via rearwardly-sloping lower top wall **136** of upper cowl section **22**.

With reference to FIG. 2, prior outboard motor structures provided an upper cowl section 22 and a two-piece lower cowl section comprising longitudinally split halves 160, 162. Each of longitudinal split halves 160, 162 included a lower depending skirt half 164, 166, respectively. Lower cowl sections 160, 162, when interconnected, are adapted to surround the edge of adapter plate 20. A foam rubber sealing strip 168 is placed about the edge of adapter plate 20, to provide a water resistant seal at the joint between adapter plate 20 and lower cowl halves 160, 162. When lower cowl halves 160, 162 are fit together, depending skirt halves 164, 166 surround the sides and rear of depending gear case 14. Skirt halves 164, 166 are generally formed integrally with lower cowl halves 160, 162.

In the improved construction of FIG. 3, as noted previously, lower cowl section 24 includes a bottom 30 and an upstanding side wall 32 extending therearound. Bottom 30 of lower cowl section 24 is provided with an opening 170 for receiving adapter plate 20 from the underside of bottom 30.

A one-piece lower skirt 172 includes a pair of depending sides 176. 178 and a rear depending wall 180 extending therebetween. Sides 176, 178 and rear wall 180 define an opening adapted to receive the upper end of depending gear case 14, which is formed accordingly.

Lower skirt 172 includes a flange 182, which is adapted for connection to the underside of bottom 30 of lower cowl section 24. The underside of lower cowl section 24 is provided with a recessed portion adjacent opening 170 for accommodating flange 182 of lower skirt 172. The one-piece construction of skirt 172 allows quick and easy removal and attachment of skirt 172 to facilitate servicing of the motor and the upper portion of gear case 14.

To assemble the lower components of the cowl assembly, sealing strip 168 is again provided about the edge of adapter plate 20, after which plate 20 is placed against the underside of bottom 30 at opening 170. One-piece lower skirt 172 is placed against the bottom of adapter plate 20 to sandwich adapter plate 20 between lower cowl section 24 and skirt 172. One-piece skirt 72 is then attached to the underside of lower cowl section 24 using a series of bolts extending through holes provided at the corners of flange 182 of skirt 172, with mating nuts being provided at nut-receiving pockets 184 in lower cowl section 24. This construction provides highly desirable vibration and noise isolation. After connection of skirt 172 to lower cowl section 24, engine portion 18 is mounted to adapter plate 20 above bottom 30 of lower cowl section 24.

Lower skirt 172 is constructed so that, after assembly, flange 182 lies in a plane substantially transverse to a longitudinal gear case axis 183.

When upper cowl section 22 and lower cowl section 24 are fit together, a peripheral joint is formed therebetween. In previous constructions, the peripheral joint between upper cowl section 22 and lower cowl section 24 was sealed about the sides and rear of the cowl assembly, but the front joint was generally left unsealed. The present invention discloses a structure for sealing the front joint.

As shown in FIG. 4, a rear joint 190 includes a substantially horizontal upper lip 192 disposed at the top of upstanding side wall 32 of lower cowl section 24. Horizontal lip 192 extends across the rear of upstanding side wall 32, and also along the sides of upstanding side wall 32. A rubber molding strip 194 is provided at the lower edge of upper cowl section 22, and has a substantially horizontal lower surface adapted to abut the top of upper lip 192 for providing a water tight seal therebetween. This construction is known in the prior art.

At front joint 195 (FIG. 12), which in the past has been unsealed, the present invention provides an upstanding lip 196 extending upwardly from a face 197 formed by upstanding side wall 32 of lower cowl section 24. Lip 196 is disposed in a plane substantially parallel to that of face 197, which may be substantially vertical. As seen in FIGS. 3 and 5–8, each corner of lower cowl section 24 adjacent face 197 is formed so as to provide a smooth transition between horizontal lip 192 on the side portions of upstanding side wall 32 of lower cowl section 24 and vertical lip 196.

Similarly, sealing strip 194 is modified at the front side of upper cowl section 22, so that the plane of sealing between lip 196 and sealing strip 194 is substantially vertical. The inwardly facing portion of sealing strip 194 is provided at its upper end with a horizontal portion 198 for abutting the top of vertical lip 196, to ensure a water-resistant seal thereat.

It is understood that various alternatives and modifications are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter regarded as the invention.

We claim:

1. In an outboard marine motor having an engine and a depending gear case extending along a longitudinal gear case axis, said engine being enclosed by a cowl, the improvement comprising a one-piece lower skirt extending downwardly from said cowl at the upper end of said depending gear case.

2. The invention according to claim 1, wherein said skirt is connected to the lower portion of said cowl in a plane substantially transverse to said longitudinal gear case axis.

3. The invention according to claim 1, wherein said cowl includes a lower cowl portion adapted to be fit together with an upper cowl portion to enclose said engine, and wherein said one-piece lower skirt is connected to said lower cowl portion.

4. The invention according to claim 3, wherein said one-piece lower skirt is provided at its upper end with a flange for connecting said skirt to said lower cowl portion.

5. The invention according to claim 4, wherein said lower cowl portion is provided with a recessed portion adapted to receive said flange portion of said one-piece lower skirt.

6. The invention according to claim 3, wherein said skirt is provided with a pair of opposed depending sides with a rear depending wall extending therebetween to thereby define an opening for receiving said depending gear case.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 4,867,120

DATED : September 19, 1989

INVENTOR(S) : Slattery, Gordon C.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

ON THE TITLE PAGE

Under the heading UNITED STATES PATENT delete "Boda et al" and substitute therefor --- Slattery ---

In item (75) Inventors: delete "James C. Boda, Winneconne; Gordon C. Slattery, Omro, both of Wis." and insert therefor --- Gordon C. Slattery, Omro, Wis. ---

Signed and Sealed this

Nineteenth Day of March, 1991

Attest:

HARRY F. MANBECK, JR.

Attesting Officer

Commissioner of Patents and Trademarks